

Virtualisation



Overview and Demonstration

Virtualisation Overview

Decoupling software applications and workloads from underlying physical hardware

Server Virtualisation

Abstracts physical server resources into multiple isolated virtual machines (VMs), allowing distinct operating systems to run concurrently on a single physical host.

KEY COMPONENTS

- Hypervisor (Type 1 & 2)
- Virtual Machines (VMs)
- Resource Pool Allocation

Network Virtualisation

Consolidates physical network devices into a software-based administrative entity, decoupling network services from physical infrastructure.

KEY COMPONENTS

- Software-Defined Networking
- Virtual LANs (VLANs)
- Virtual Switches & Routers

Storage Virtualisation

Pools physical storage capacity from multiple devices into a single, centrally managed logical storage array for higher efficiency and elasticity.

KEY COMPONENTS

- Storage Area Networks (SAN)
- Logical Unit Numbers (LUNs)
- Software-Defined Storage

KVM (Kernel Module)

Turns the Linux kernel into a Type-1 hypervisor. Handles CPU and memory execution directly on host hardware with minimal overhead.

KEY CAPABILITIES

- Hardware Virtualization
- Intel VT-x & AMD-V Support
- Direct vCPU Scheduling

QEMU (Emulator)

User-space emulator that provides virtual hardware components, guest memory allocation, and complete machine setup.

KEY CAPABILITIES

- Peripheral Device Emulation
- Virtual Disk Image (QCOW2)
- Cross-Platform Support

QEMU + KVM

QEMU delegates CPU/RAM execution to KVM via /dev/kvm while managing I/O devices, delivering near-native performance.

KEY ADVANTAGES

- Near-Native CPU Speed
- Paravirtualized VirtIO Drivers
- Live VM Migration

Comparing OS Requirements and Capabilities

Lubuntu (Lightweight)

Purpose: Resource-efficient and optimized for older hardware.

Requirements: Low (e.g., 1GB RAM, 20GB disk).

Capabilities: Fast, basic productivity, web browsing, old hardware revitalization.

KEY CAPABILITIES

- Resource Efficiency
- Extended Support Cycles
- Wide Software Selection (Ubuntu Repositories)

Ubuntu (Standard)

Purpose: Standard desktop for general-purpose computing.

Requirements: Moderate (e.g., 4GB RAM, 25GB disk).

Capabilities: Stability, comprehensive app support, widespread enterprise and community adoption.

KEY CAPABILITIES

- Stability and Predictability
- Vast Software and Driver Support
- Extensive Documentation and Tutorials

Pop!_OS (Optimized for Workflow)

Purpose: Designed for developers, scientists, and creators; strong out-of-the-box experience.

Requirements: Moderate-High (e.g., 4GB+ RAM, 25GB disk).

Capabilities: Auto-tiling, strong GPU integration, excellent workflow tools.

KEY ADVANTAGES

- Optimized Multi-GPU Switching
- Built-in Auto-tiling
- Streamlined Update Process

Demo

Some notes on the text file